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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/539,743	02/13/2006	Hoo-Geun Lee	29347/50809	5025
4743 7590 03/05/2009 MARSHALL, GERSTEIN & BORUN LLP 233 SOUTH WACKER DRIVE 6300 SEARS TOWER CHICAGO, IL 60606-6357			EXAMINER SHEVIN, MARK L	
			ART UNIT 1793	PAPER NUMBER
			MAIL DATE 03/05/2009	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/539,743

**Applicant(s)**

LEE ET AL.

**Examiner**

MARK L. SHEVIN

**Art Unit**

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 19-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

## DETAILED ACTION

### *Status of Claims*

1. Claims 1-30, filed November 7<sup>th</sup> 2008, are currently under examination. Compared to the claims filed July 7<sup>th</sup>, 2006 and examined in the previous Office Action mailed May 7<sup>th</sup>, 2008, claims 1-9 and 11-18 have been amended and claims 19-30 are withdrawn.

### *Status of Previous Rejections*

2 The previous rejection of claims 1-4, 6-7, and 9-18 under 35 U.S.C. 103(a) over **Joo** (US 6,277,324) in view of **Hofmann** (US 3,897,183 A1) and **Fayed** (Rolling Pressing, in *Handbook of Powder Science and Technology*, 2<sup>nd</sup> Ed., edited by M.E. Fayed and L. Otten, 1997, ch. 6, p. 345-363.) have been maintained.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. The previous rejection of claim 5 under 35 U.S.C. 103(a) over **Joo** in view of **Hofmann** and **Fayed** in further view of **Freytag** (US 6,074,456) has been maintained.

4. The previous rejection of claim 8 under 35 U.S.C. 103(a) over **Joo** in view of **Hofmann** and **Fayed** in further view of **McClelland** (US 6,352,573) has been maintained.

### *Claim Rejections - 35 USC § 103*

5. Claims 1-4, 6-7, and 9-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** (US 6,277,324) in view of **Hofmann** (US 3,897,183 A1) and

**Fayed** (Rolling Pressing, in *Handbook of Powder Science and Technology*, 2<sup>nd</sup> Ed., edited by M.E. Fayed and L. Otten, 1997, ch. 6, p. 345-363.)

Joo

Joo, drawn to an apparatus and method for manufacturing molten pig iron, teaches producing reducing material of mixed hot fine direct iron and calcined additives from multiple fluidized beds (col. 2, lines 17-34).

A briquetting device, **16**, receives calcined additives such as lime and reduced iron, to roll press (col. 5, lines 1-8, col. 7, lines 38-43) these components to form into compacted material.

The reduced iron and calcined additive are charged into a melter-gasifier **31** to be manufactured into a molten iron (col. 10, lines 27-38) by injecting oxygen (Figs. 3-5 and col. 12, lines 13-25) into a coal packed bed (col. 10, lines 39-42).

Joo does not teach forming grooves on the pressed surfaces, crushing the compacted material, charging the crushed compacted material to coal-packed bed, or the geometry of the roll pressed compacts.

Hofmann

Hofmann, drawn to a method of roll pressing or briquetting, teaches producing briquettes from direct reduced iron in sheets of D-shaped pillows / lumps through the use of roll pressing. The lumps are interconnected by lands because the high pressures required by rolling make it necessary to have some clearance between the rolls (col. 1, lines 5-20). The rolled sheet product of direct reduced iron fines (col. 2, lines 29-31) is shown in figures 3 and 4. Grooves are formed on the pressed surfaces

are shown in Fig. 4. The shape of the briquette shape is designed easily break and separate the briquettes from one another during crushing as shown in Fig. 1.

Any compacts that are not first crushed are recycled to be crushed again to reduce them to the proper size (col. 5, lines 1-10).

Fayed

Fayed, drawn to the principles and processes of double roll pressing, teaches after forming briquettes or compacts in the form of a sheet, these sheets are crushed and screen to yield a granular product (p. 345, col. 2, paras 1-2).

The pocket / mold shape is crucial in roll pressing in terms of gas release, release of the formed compacts, and the density of the final product (p. 361, col. 1, paras 1-3).

Fayed also teaches that the roll gap and thus the thickness of the roll pressed sheet produced, is a result effective variable (p. 352, col. 1, para 6 - p. 353, col. 1, para 1).

Shallow pockets improve deaeration (p. 356, col. 1, para 2).

Regarding claims 1, 9 and 10, it would have been obvious to one of ordinary skill in metallurgy, at the time the invention was made, taking the disclosures of Joo, Hofmann, and Fayed as a whole, to incorporate the briquette shape of Hofmann and the crushing step as taught by both Hofmann and Fayed for the following reasons. The briquette shape of Hofmann allows the easy separation of briquettes by crushing the sheet to as taught by Hofmann. Fayed adds that the pocket shape, and thus shape of the briquette is critical in the process of roll pressing and that shallow pockets improve

deaeration. The briquette sheet is then crushed as taught by both Hofmann and Fayed to obtain material of a chosen size.

With respect to the briquette shape of claims 1, 9, and 10, Fig. 4 of Hofmann shows a sheet profile where the grooves on a first surface are positioned between two adjacent grooves of second surface.

With respect to the amendments to claims 1 and 9, these changes do not affect the scope of the instant claims and thus the instant rejections still apply.

Regarding claim 2, Fayed teaches that to obtain positive feed pressure and provide a more versatile means of control, screw feeders should be used (p. 346, col. 2, para 2) such as those with inclined screw feeders as shown in Figure 6.183(b) on p. 347, col. 1. Such screw feeders produce precompaction pressure that may be optimized (p. 355, col. 1, para 2).

With respect to the amendments to claims 2, these changes do not affect the scope of the instant claims and thus the instant rejection still applies.

Regarding claim 3 and 15, Hofmann's sheet was between 0.1" (2.54 mm) and 1" (25.4 mm) thick (col. 3, lines 22-26) and the density will be a function of the rolling speed, roll diameter, and a host of other factors as taught by Fayed.

With respect to the amendments to claims 3, these changes do not affect the scope of the instant claims and thus the instant rejection still applies.

With respect to the amendment to claim 15 adding "continuous", Hofman's sheet that is being referred to is continuous compacted material.

Regarding claims 4 and 16-18, Joo teaches that the iron agglomerates are between 8 and 35 mm and that the coal in the coal packed bed is between 8 and 50 mm. MPEP 2144.05, para I states: "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists."

With respect to the amendment to claims 4 and 16-18 adding that the crushed compacted material has a grain size of 50 mm or less (30 mm or less for claim 17), Hofman crushed his agglomerates and Joo taught the preferred size range for later use.

Regarding claim 6, Hofmann teaches that any compacts that are not first crushed are recycled to be crushed again to reduce them to the proper size (col. 5, lines 1-10).

With respect to the amendments to claim 6, these changes do not affect the scope of the instant claim and thus the instant rejection still applies.

Regarding claim 7, Hofmann teaches that when processing such hot reactive materials, an inert atmosphere, such as nitrogen, is needed (col. 2, lines 29-34).

With respect to the amendments to claim 7, these changes do not affect the scope of the instant claim and thus the instant rejection still applies.

Regarding claim 11, Joo teaches mixing hot calcined additives such as calcined lime from multiple fluidized beds with fine direct reduced iron (col. 2, lines 17-34).

With respect to the amendments to claim 11, these changes do not affect the scope of the instant claim and thus the instant rejection still applies.

Regarding claim 12, Joo teaches that about 360 Kg of lime stone is required to produce one ton of molten iron and Joo thus teaches the amount of lime and the resultant quick lime (CaO) as a result effective variable in the production of heat and

CO<sub>2</sub> gas that is discharged to the fluidized beds and one of ordinary skill would select the claimed range of additive content through routine experimentation.

With respect to the amendments to claim 12, these changes do not affect the scope of the instant claim and thus the instant rejection still applies.

Regarding claim 13, Hofmann teaches that his briquetting process is conducted between 1000 and 2000 °F (538 – 1093 °C) and MPEP 2144.05, para I states: "In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists."

With respect to the amendments to claim 13, these changes do not affect the scope of the instant claim and thus the instant rejection still applies.

Regarding claim 14, Hofmann teaches that his roll press uses a pressure of between 20 and 350 tons and the Examiner holds that this range, when converted to bar, overlaps the claimed range.

With respect to the amendments to claim 14, these changes do not affect the scope of the instant claim and thus the instant rejection still applies.

6. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** in view of **Hofmann** and **Fayed** as applied to claims 1-4, 6-7, and 9-18 above, in further view of **Freytag** (US 6,074,456).

The disclosures of Joo, Hofmann, and Fayed were discussed above, however none of these references taught the additional steps of bypassing the crushed compacted material, cooling, and subsequent storage.



Freytag

Freytag, drawn to a process for hot briquetting granular sponge iron (direct reduced iron), teaches that by cooling **(10)** the hot briquettes after formation in a roll press, wear on subsequent process equipment can be minimized (col. 1, lines 52-68) In particular, classified / size separation devices have unnecessarily high wear when processing materials at a high temperature. Furthermore, protective gas is not needed during temporary storage (col. 2, lines 1-6).

Regarding claim 5, it would have been obvious to one of ordinary skill in metallurgy, at the time the invention was made, to incorporate the hot briquette cooling method of Freytag into the process of Joo, Hofmann, and Fayed as Freytag teaches that cooling briquettes reduced wear on subsequent processing equipment and allows storage without protective gas.

With respect to the amendments to claim 5, these changes do not affect the scope of the instant claim and thus the instant rejection still applies.

7. **Claim 8** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Joo** in view of **Hofmann** and **Fayed** as applied to claims 1-4, 6-7, and 9-18 above, in further view of **McClelland** (US 6,352,573).

The disclosures of Joo, Hofmann, and Fayed were discussed above, however none of these references taught additional steps of wet scrubbing dust particles collected in each step and discharging the dried dust particles to the outside.

McClelland

McClelland, drawn to an improved method for separating and recycling hot fines produced in the hot briquetting of reduced iron (col. 1, lines 12-15), teaches that fines are especially produced during the breaking or crushing operation after roll pressing reduced iron (col. 1, lines 26-37). The fines should be removed and recycled in an economically feasible way (col. 1, lines 35-36) even though they are somewhat dangerous due to their pyrophoric nature (col. 1, lines 50-53).

Fines are removed after briquetting by pulling gas from the briquetting machine fines separator **16** to a wet scrubber **18** where it is compressed and reintroduced into the briquetting machine housing through inlet nozzle **36** (col. 4, lines 1-22 and claim 1).

Regarding claim 8, it would have been obvious to one of ordinary skill in metallurgy, at the time the invention was made, to incorporate the wet scrubbing process of McClelland into the process of Joo, Hofmann, and Fayed, as McClelland teaches that his recycling process has only one moving part, the blower, favorably recycles inert gases back to the briquetting machine, and allows for selective classification of fine particles to be removed (col. 4, lines 60-67).

With respect to the amendments to claim 8, these changes do not affect the scope of the instant claim and thus the instant rejection still applies.

***Response to Applicant's Arguments:***

8. Applicant's arguments filed November 7<sup>th</sup>, 2008 have been fully considered but they are not persuasive.

Applicants assert (p. 9, para 2) that Joo fails to disclose forming compacted material in the shape recited in the pending claims.

In response, Joo was not used to teach the shape of the compacted briquettes and thus it is not indicative of nonobviousness that Joo does not teach this feature because it was taught by Hofmann instead.

Applicants assert (p. 9, para 3) that the side profile view of the briquettes is not representative of the actual shape of the briquettes or briquette sheet because the briquettes on opposite side of the sheet are not overlapping - therefore the grooves on one surface are not spaced between the grooves of the second surface.

In response, the asserted features are not reflected in the instant claims and Applicants have not pointed out how Hofmann or the cited references do not teach or suggest the claimed briquette shape. Fig. 4 of Hofmann still shows a sheet profile where the grooves on a first surface are positioned between two adjacent grooves of second surface. There is no requirement that briquettes on the opposite side of the sheet overlap.

Applicants assert (p. 9, para 4) that Fayed fails to disclose the claimed compacted briquette shape.

In response, like Joo, Fayed was not used to teach the shape of the compacted briquettes; this feature was taught by Hofmann instead.

Applicants assert (p. 10, para 1) that the cited references fail to teach the shape of the compacted material as recited in the pending claims, but instead teach briquettes,

and teach flashing attached to the briquettes whereas the briquettes of the instant invention do not have flashing.

In response, Hofmann does teach forming compacted material as in Fig. 4, which are not yet crushed to form briquettes. There is no mention of the presence or absence of flashing in the instant claims.

Applicants assert (p. 11, para 2) that the cited references fail to teach or suggest the advantages associated with the shape of the compacted material.

In response, a recognition of the advantages of the claimed briquette shape is not required when Hofmann discloses the claimed briquette shape in his patent and figures.

### ***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

**-- Claims 1-18 are finally rejected**  
**-- No claims are allowed**

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since

other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

**/Mark L. Shevin/**  
Examiner, Art Unit 1793

February 24th, 2009  
10-539,743

**/George Wyszomierski/**  
Primary Examiner  
Art Unit 1793